Nonintrusive Optical Thermometers for Real-Time Control of Fabrication Processes, Phase I

Completed Technology Project (2006 - 2006)

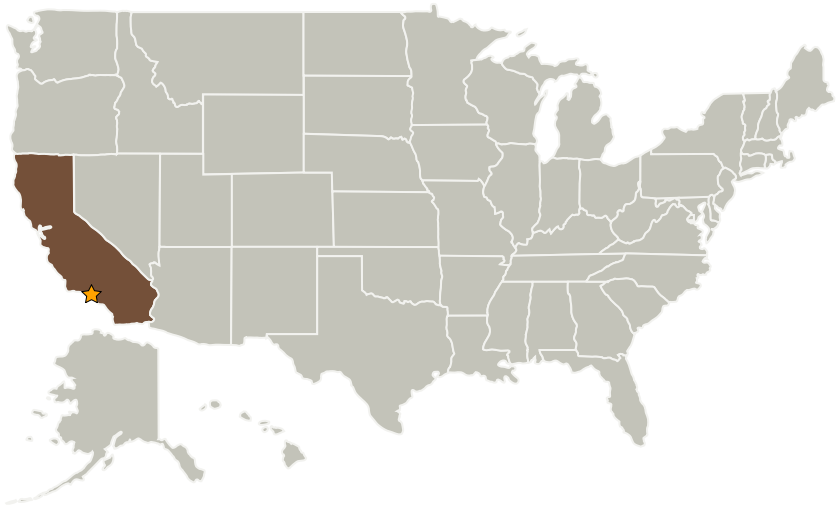
Project Introduction

The objective of the proposed SBIR Phase I program is to develop an instrument that provides real-time, in situ measurements of substrate temperature in optical coating reactors. The instrument will employ an inexpensive diode laser, fiber optic components, and established laser interferometry methods to determine substrate temperature at multiple locations with a replicate precision of better than 0.1 degrees C in a measurement time of less than 0.2 seconds. The precision may be improved with increasing measurement time, if desired. The instrument (an "optical thermometer") will be demonstrated on optical substrates made of a variety of materials in state-of-the-art industrial reactors specializing in UV, visible, near-IR and IR optical coatings. The fast response of the sensor will enable coaters to use, for the first time, precise measurements of bulk substrate temperature to identify temperature nonuniformities during the coating process, refine and improve coating processes in real time, and minimize batch-to-batch variations through closed-loop process control.

Anticipated Benefits

Potential NASA Commercial Applications: Non-NASA Commercial Applications include: process control of optical coating reactors, control of semiconductor process (etch) reactors and other industrial processes

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Jet Propulsion Laboratory (JPL)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Jet Propulsion Laboratory(JPL)	Lead Organization	NASA Center	Pasadena, California
Los Gatos Research	Supporting Organization	Industry	Mountain View, California

Primary U.S. Work Locations
California

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

Douglas S Baer

Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
  - TX12.1 Materials
    - TX12.1.5 Coatings